



# The Effects of Environmental Parameters on the Shear Strength of Brickwalls

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## ABSTRACT

Following the destructive bam earthquake of 2003 , The Iranian Government initiated a vast program of seismic retrofitting for existing buildings throughout the country . As a result of the retrofitting program, an extensive amount of field test data is available on the shear strength of brickwalls of buildings from different parts of the country having different climates. A large portion of the available data is utilised in this paper to determine the effects of environmental condition, Particularly those of humidity and temperature, on the shear strength of brickwalls. The effects of other factors including the age of the building are also investigated. Results of the statistical analyses highlight the important effects of the location humidity level . It is recommended that for assessing the vulnerability of buildings, regionalization is considered and an appropriate climate factor is adopted.

Keywords: Shear Strength, Brick wall, Environmental Parameters.

## 1. INTRODUCTION

In unreinforced masonry buildings, the earthquake-induced lateral loads are generally sustained by walls. Because of the important role of these elements in resisting seismic loads, their in-plane shear strength should be known for such studies as the seismic vulnerability evaluation and retrofitting. Many different factors may affect the in-plane shear strength of a brick wall. Some of the most important factors include; material types and properties, workmanship during construction, post-construction environmental conditions and the age of the wall. Much research has been conducted on the effects of material types and properties on the strength of brickwork [1]. Also, some work has been reported in the literature on the influence of bad workmanship on the strength of masonry walls; whether in the form of improper arrangement of brick units and mortar joints or in the form of using dry brick units and stiff mortars [2]. Another important factor affecting the strength of a brick wall is the pre and post-construction humidity condition surrounding the wall. This factor has been generally overlooked by the researchers, but was found to highly affect the strength of a brick wall.

A brick wall is a composite structure; therefore, an important factor influencing its strength is the capacity of bond between mortar and the brick units. The main factors affecting the bond strength are the brick absorption rate and the moisture content of the brick at the time of laying. Brick water absorption can significantly affect interface bond strength because it determines the amount of water transmitted from the mortar to the brick. This in turn controls the degree of hydration of the mortar. Some work is available in the related literature on the adverse effects, on the brick-mortar bond strength, of the lack